# CONTRIBUTION TO THE STUDY OF THE TRAUMATIC NEURO-PSYCHOSES.

By G. L. WALTON, M.D.,

Instructor in Diseases of the Nervous System, Harvard University; Physician to the Neurological Department of the Massachusetts General Hospital.

THE pathology and prognosis of the injuries inflicted upon the nervous system by railway collisions and similar accidents, have furnished, perhaps, as much material for discussion, during the past decade, as any other subject in medical science. The diversity of opinion on this subject is peculiarly unfortunate, in that it is not merely one of scientific interest, but one of great practical importance.

It is curious that the first impetus was given to this distinctly neurological subject by a surgeon, and that his views should have been for so long a time adopted, practically unchallenged, as to have become largely incorporated into the text-books of neurology (Erb, Gowers, Ross) as well as surgery.

Under the influence of Erichsen's views, functional and organic injuries were for a long time indiscriminately classed together under the ambiguous and misleading term, spinal concussion, and a common prognosis was given to all, varying, it is true, in its possibilities, from death to recovery, but leaving the student in doubt, whether there were any method of forming even a probable opinion in a given case, as to whether the worst or best result might be expected.

To Page[1] is due the credit of elaborately correcting this inaccuracy, and of sifting out the comparatively rare cases of organic spinal disease, whose sad course and prognosis had been so long allowed to overshadow and include the more common cases in which no demonstrable lesion existed. To the latter class he first applied the term traumatic neurasthenia. The difficulty of injuring the spinal cord as long as its bony covering remained intact, was also first pointed out by this observer. Since, and largely on account of, the appearance of Page's work, a decided, though not unanimous, modification of opinion has taken place regarding the pathology of these cases, though there is still considerable variance regarding their prognosis, even among those who have accepted the theory of a functional basis for the majority of the cases.

---

[1] Injuries to the Spine and Spinal Cord: Herbart W. Page, A.M., M.C., 1883.

The advance in our knowledge of the subject has been doubly rapid through being gained not only from medico-legal observers, but also from clinical investigations in hysteria, more especially those of Charcot and his followers, whose studies have thrown light on the more stabile forms of this protean disease, which has removed the objection originally presented, to classing under this head cases with symptoms comparatively fixed in seat and character. Indeed, as is well known, Charcot at first considered all these cases simply hysteria.

Dr. Putnam,[2] in 1883, after reporting several cases of traumatic hemi-anæsthesia, called attention to the importance of looking for evidences of typical hysteria, in the chronic as well as in the acute stages of so-called spinal concussion. In the same year, in illustration of the general tendency to withdraw the attention from the spinal cord, the writer,[3] in a paper on the cerebral origin of symptoms sometimes classed under spinal irritation, proposed the name "railway brain" as more appropriate than "railway spine" to designate the class of traumatic cases under discussion. This name has been quite extensively adopted, though, as Thorburn comments, it was only a step in the right direction.

Among those who early inclined toward the modified views regarding the effects of trauma on the nervous system, may be mentioned Dana,[4] who, writing in 1883, very appropriately added hypochondria to the two terms already applied, a term widely applicable in view of the morbid introspection and self-study which does so much to increase and perpetuate the subjective symptoms. This writer, while considering spinal concussion a possibility, preferred to regard the majority of cases thus designated as traumatic hysteria, hypochondria, or neurasthenia, associated more or less with symptoms of injury to the vertebral ligaments and muscles, and to the spinal nerves. The prospect for improvement he considered good, but not that for perfect recovery.

---

[2] Recent Investigations into the Pathology of so-called Concussions of the Spine, etc.: Boston Med. and Surg. Jour., Sept. 6, 1883.

[3] Spinal Irritation: Probable Cerebral Origin of the Symptoms, etc.: *Ibid.*, Dec. 27, 1883.

[4] New York Med. Record, Dec. 6, 1884.

Spitzka[5] had considered that spinal concussion could produce spinal irritation, a disturbance not to be mistaken for myelitis or meningitis, but at the same time one whose severity should not be lightly regarded.

These theories were in direct opposition to the idea advanced by Westphal[6] of a diffuse sclerosis set up by the jar, perhaps through the mechanism of minute hemorrhages, as well as to the views of Leyden,[7] which favored organic disease as a common sequel concussion. Among the followers of Westphal were numbered originally in Germany Oppenheim[8] and Thomsen, and in America Knapp[9] and others. The conscientious and thorough work of Oppenheim in this direction became so generally recognized that his later conclusions[10] designating the majority of the cases as neuro-psychoses have had perhaps more influence than the efforts of any other writer since Page in modifying the general opinion.

Knapp,[11] in a later article, adopts the classification of Oppenheim, though still adhering to the view that certain of these cases should be classed under the sclerosis of Westphal.

---

[5] Am. Jour. of Neurology and Psychiatry, Aug., 1883.

[6] Einige Fälle von Erkrankung des nervou Systems nach Verletzung auf Eisenbahnen. Charité-Amalen, v. 379, 1878.

[7] Klinik der Rückenmarkskrankheiten, B. II., Berlin. 1875.

[8] Berl. klin. Wochenschrift, 1884 ; Archiv. f. Psychiatrie, 1885, vol. xvi.

[9] Boston Med. and Surg. Jour , Oct. 25, 1888.

[10] Berl. klin. Wochenschrift, 1888, No. 9.

[11] Boston Med. and Surg. Jour., Dec. 19, 1889.

Thorburn,[12] in his excellent work on the surgery of the spinal cord, states that recent writers are practically unanimous in agreeing that concussion of the spinal cord is at least an extremely rare lesion, though there is still much dispute as to the significance of the nervous symptoms commonly observed after severe physical or physical and psychical shocks. His views of the pathology and prognosis of the disease do not differ materially from those of Page, though he draws the distinction more closely between hysteria and neurasthenia.

In a recent work by Clevenger,[13] of Chicago, it is proposed to give to these cases the name "Erichsen's disease," in honor of one whose work this author considers, with some modifications, standard. This writer regards the spinal sympathetic system as the starting point of the pathological process, but reverts in general to the spinal cord as the principal seat of disease, encouraging also the view that myelitis, meningitis, meningo-myelitis, locomotor-ataxia, diffuse and lateral sclerosis are not uncommon sequelæ of trauma.

Seguin,[14] in his admirable summary of recent progress in Sajous' Annual of 1889, based on the articles of Oppenheim, Knapp, Strümpell, Bajinsky, Wolffe and Shaw, considers organic injury to the nervous system a rarity as resulting from the forms of trauma under-consideration. He lays much stress on suggestion, both hypnotic and non-hypnotic, discusses deliberate malingering, and emphasizes the prominence of subjective, and absence of objective symptoms. He criticises the too common habit of accepting literally the statements of the patient regarding his own sufferings.

Without exhausting the literature of the subject, it may fairly be concluded that there is at present a very general, though not unanimous tendency to abandon the theory of spinal concussion as at all widely applicable to the class of cases under consideration, and to regard the majority of the genuine cases as identical with already recognized functional forms of disease, rather than as cases of organic spinal injury.

---

[12] Contribution to the Surgery of Spinal Cord by Wm. Thorburn, B.S., B.Sc., M.D. (Lond.).

[13] Spinal Concussion, etc., by S. V. Clevenger, M.D. Phila., 1889.

[14] Vol. iii. Q.

My own experience has lead me from the first to regard disease of the spinal cord resulting from trauma as of comparative rarity, when no dislocation or fracture has occurred, while Seguin's conclusion regarding the predominance of subjective symptoms, and the degree in which we are generally dependent on the patient's statement, are fully justified by the majority of the cases which have come under my observation.

I have especially noted the rarity of such symptoms as local atrophy, fibrillary twitching, bed-sores, cystitis, disturbance of electrical reactions, involuntary rigidity, spastic gait, toe-drop, ankle clonus, pupil irregularities, and disordered reflex (beyond mere activity, which, as Seguin states, is alone of no diagnostic value). The symptoms nystagmus, and incontinence of urine, which Knapp inserts in his *résumé*, I have found notably absent. A number of the patients have *complained*, it is true, of retention or incontinence, but absence of palpable proof of these symptoms has forced me in every instance of the class of cases under consideration, to regard the statement with considerable skepticism. In fact, questioning the patient alone has generally sifted down the complaint to frequency or delay of micturition, symptoms which are common in functional cases, non-traumatic, as well as traumatic, and which, as compared to the true retention which causes overflow unless the catheter is used or to the true incontinence resulting from organic disease, with its attending annoyances both to the patient and his friends may almost be regarded as trivial. Nor do even these mild forms of bladder trouble necessarily exist in every case where claimed, but they must be reckoned among those symptoms for which we have no evidence beyond the patient's statement. In the same category, I should agree with Seguin in placing anæsthesia, both general and special, and of course, also, hyperæsthesia, and paræsthesia, as well as pain. I have become so convinced that in the case of a practised simulant the various tests for anæsthesia, even including the wire brush, are non-conclusive, that in many cases I make no attempt to either establish or confute the claim, but set it down as a symptom for which I have the patient's statement only, just as for the pain, sensitiveness, bad dreams, and other symptoms; no one but himself knowing whether it is present or not, and in view of Seguin's observations regarding suggestion, it may, perhaps, in genuine cases, sometimes even be doubtful whether the patient himself has any very definite consciousness of the exact severity of these subjective symptoms.

In a similar category, I should place certain symptoms occasionally seen, upon which Knapp has laid stress as almost of necessity pointing to organic disease; such are: the complaint of a constriction about the waist, swaying with closed eyes, tremor, and a staggering gait. The sense of constriction may be as easily complained of by the hysterical or neurotic patient or the simulant as impotence or any other subjective symptom, while swaying, tremor, and staggering may occur as symptoms of functional trouble or general debility, or again may be easily simulated. A tremor of the head, for example, may be kept up a considerable time without fatigue, by resting the hands on a walking-stick upright between the knees, or upon the edge of a table. A rythmical movement may be started by the arms in this position by which the head is caused to oscillate forwards and backwards, the movement being a comparatively natural one, and causing little fatigue. This variety of tremor, as well as less successful attempts at tremor of single extremities, I have seen, where I was convinced of the presence of simulation. I have also seen a voluntary tremor in the leg which was apparently an attempt to produce an ankle clonus.

It will be noted in the *résumé* of cases following, that a large number complained of loss of power. The loss was, as a rule, quite generalized, involving one or more entire extremities. In some of these cases there was palpable fraud, shown, for example, by the patient making with ease, when his attention was diverted, the same movements which he had declared himself absolutely unable to perform. In others the loss appeared genuine, while in others it was impossible to decide to a certainty whether the case was one of fraud or hysteria. In none of the cases which I have classed under the neuro-phychoses was the gait characteristic of organic disease, the foot being generally everted and dragged with its whole length scraping the floor, or again, the foot would sometimes clear the ground entirely, sometimes scrape with the heel as well as the toe, a gait which, if genuine, points rather to hysteria than to organic disease. In some cases oddities of gait appeared which could not be brought under any recognized class of paralytic gait.

Typical hysterical contracture was present, I think, in only one case.

Allied to the active reflex I have often found a rapid, but otherwise normal pulse, a symptom upon which I have seen great stress laid in courts, but which has generally been either the result of excitement or of weakness, or of a neurotic or hysterical tendency, associated, for example, with large pupils. In investigating this symptom, I have been surprised to find how easily the normal pulse is elevated to 100 and over, even on moderate excitement. Indeed, a pulse-beat of 90 to 100 is by no means an extreme rarity in a healthy individual, whether male or female (though, of course, more common in the female), considerations which should make us chary of attributing too much importance to a rapid but otherwise healthy pulse. The fact that a rapid pulse is often found in locomotor ataxia is hardly sufficient ground for advancing this symptom as proof of organic disease of the cord in the absence of other objective signs. The same is true of the active reflex, unaccompanied by clonus, especially when it is accompanied by the complaint of disagreeable sensation up or down the leg, into the groin, back or head, or when accompanied by the peculiar give, or jump, which neurasthenic and hysterical patients sometimes exhibit. It would certainly seem that these symptoms, occurring, as they generally have in my cases, in connection with such subjective symptoms as inability to confine the attention, emotional tendency, flushes and chills, or nervous irritability, rather than with definite objective signs, should cause us to look upon them, where considered symptoms at all, as symptoms of a condition known to be present, rather than of one for which we have no further evidence.

My experience has lead me to coincide with Page's view, as already stated, that it is extremely difficult to injure the spinal cord excepting through the medium of its bony canal. I do not mean that such injury is impossible, in fact, during the period in which the cases referred to in this paper have come under my observation, I have seen two cases (elsewhere reported)[15] of undoubted hemorrhage into the substance of the spinal cord, each with atrophic paralysis with degeneration reaction of arm muscles on one side, and one with spastic condition of the corresponding leg, the symptoms appearing directly upon the accident, which was in each case a severe one. I have also seen a case in which the symptoms, including spastic gait and ankle clonus pointed to hemorrhage about the cord, and several of injury to nerve roots, with characteristic distribution of motor and sensory paralysis, as investigated physiologically by Ferrier and Yeo,[16] anatomically by Herrigham,[17] and clinically by Ross,[18] Thoburn[19] and others. In all these cases objective signs of spinal injury were present, and only in such cases have I felt justified in making the diagnosis of organic injury to the spinal cord which did not implicate the bony canal, the *possibility* that minute hemorrhages may take place in an organ hardly seeming to me sufficient ground for making such a diagnosis during life, unless certain symptoms have been established as diagnostic of that condition. As regards the term spinal concussion, I have not yet seen a case in which I felt justified in making this diagnosis ; I do not think it is to be found in the books of the neurological department of the Massachusetts General Hospital.

---

[15] Cases of Functional and Organic Injury, etc.: Boston Med. and Surg. Jour., Feb. 4, 1886.

[16] Proceedings of the Royal Society, No. ccxii., p. 12: Brain, 1882.

[17] *Ibid.*, No. ccxliii., 1886, p. 255.

[18] Brain, Jan., 1888.

[19] A Contribution to the Surgery of the Spinal Cord.

There are one or two points regarding the protection of the spinal cord which have occurred to me, beyond those to which attention has already been called. The fact has been emphasized that the cord is an organ comparatively light in weight, that it is suspended in a fluid comparatively greater in quantity than that surrounding the brain, and that it is further surrounded by membranes, areolar adipose tissue, and a thick plexus of blood-vessels. I would also call attention to the fact that the construction of the vertebræ is such that the force of a blow upon the spinous process must pass *around* the spinal cord, to be principally expended upon the bodies of the vertebræ, perhaps also in part to the ribs. Again, besides the flexibility of the vertebral column as a whole, which tends to lessen the force of a blow, the downward inclination of the spinous processes in the greater part of the column would tend to tilt the corresponding vertrebra, thus still further adding to the elasticity of the protecting structure.

As regards locomotor ataxia, lateral or disseminated sclerosis, and similar diseases, it seems to me that our knowledge of the pathology and course of these diseases, together with their insidious mode of onset, should make us extremely chary of accepting a traumatic origin, even though isolated cases have been reported by most eminent authority, as dating from an accident. Some allowance must be made for coincidence. I have recently seen, for example, a patient with typical locomotor ataxia, who, with no claim for compensation, dates his trouble from a strain of the back; the strain proving, however, on investigating the case, to be nothing more than a coincidence, an acknowledged specific history pointing to the more probable etiology.

Such cases might be multiplied indefinitely, and should lead us to avoid the tendency in examining legal cases, to accept at once statements regarding previous health, by patients who do not always recognize their own condition, thus neglecting, in cases involving large sums of money, to use the caution we should apply to outside cases, merely as a matter of scientific interest, or for ordinary purposes of accuracy.

Analysis of one hundred successive cases as found in my notes, where nervous symptoms were complained of, and where the question of damages had arisen or was likely to arise, gives the following results:

There were two cases of vertebral fracture, one of vertebral dislocation, one of injury to cervical nerve roots, two of probable neuritis, one of long-standing spinal sclerosis, one of old infantile paralysis, one of extensive atheroma, one of choroiditis, four of heart disease, one of cystitis of local origin, and two of severe constitutional disease with emaciation (phthisis, scrofula). Four of these seventeen cases have died, one directly from the effects of broken back followed by bed-sores and cystitis, and one from phthisis; in the other two, designated above as neuritis and atheroma, the exact nature of death has not been ascertained. In one of the remaining cases I am still in doubt as to the diagnosis. This was the case of a brakeman who was thrown from the top of a freight-car, striking on his back. When I saw him, the back was held stiffly and the legs rigid. He appeared able to get about only with great difficulty and a short distance by the aid of crutches. He complained of loss of sensation as well as power in both legs. Satisfactory examination was impossible on account of the patient's unwillingness to be examined. No irregularity of the back was found. There was present, however, not only an active knee-jerk, but a marked and continuous ankle clonus on both sides, and on the strength of this symptom I reported to the road by whom I was sent to examine him that, notwithstanding the incompleteness of the examination, I was satisfied that there must be organic injury to the spinal cord. Upon this report the case was settled for a large sum. Not long after I learned that he had recovered after a course of treatment at some resort, and at present I am informed that he is serving a term in the State prison, having been convicted of a rape committed shortly after the settlement. Whether this was a case of hemorrhage about the cord with absorption, or whether it was an exceptional case of functional disorder or of simulation, in which ankle clonus was present, or whether some other explanation can be offered, this exceptional history would not of course alter the fact that, as a rule, a marked and continuous ankle clonus denotes organic injury or disease. That the symptom was simulated I can hardly believe.

The remaining eighty-two cases, with the exception of the simulants, would fairly come under the class designated by Oppenheim as neuro-psychoses, either alone or complicating surgical injuries. (These surgical injuries, in some cases serious, will be left out of consideration in this paper as foreign to the subject.)

In a large number of the cases there was gross exaggeration, and in a certain number deliberate fraud was detected; but for the purpose of this analysis, which has rather to do with the question of organic as against functional trouble, it will not be necessary to separate these classes. In a large number of these cases the claim of spinal injury was made, either without specifying the pathology of the injury, or as concussion, sclerosis, myelitis or meningitis, an opinion in which I could in no case concur.

The nature of the trauma ranged from slight jars and moderate blows on various parts of the body to violent collisions and severe falls. The nervous symptoms bore, on the whole, comparatively little relation in point of severity to the violence or direction of the trauma after the first effects were over. Identical symptoms were complained of, for example, after blows upon the extremities, with those following blows upon the back and head, or injuries causing a jar of the whole body, which shows at least that a concussion of the spine or even of the brain, is not an essential factor in their production.

The time of my examination ranged from one week to three and one-half years after the accident.

Pain in the head and back was complained of in forty-six cases; in the back alone, in twenty-four; in the head alone, in six, making a total of seventy-six cases complaining of back, in the head or back, or both. In a lesser number pains, without physical signs, were complained of in the abdomen, sides, arms, legs, neck, chest, groin, and "all over."

Sensitiveness was noted in the back in forty cases, and in a lesser number in various other regions, including the head, chest, sides, abdomen, and extremities. It was common for sensitiveness and pain to be complained of in the exact region where blows had occurred, at intervals of months and even of years, after the accident, after all external signs had passed away. This is a symptom difficult to trace to spinal disease, but readily understood when the mental element is considered, peculiar to hysteria and hypochondria, even without having recourse to the theory of simulation, which was of course, in some cases, present. Headache and backache, however, seemed to occur quite irrespective of the nature or seat of injury.

Following are the other symptoms complained of as far as found in my notes:

Blurred vision, vertigo, menstrual irregularities, deafness, constipation, diarrhœa (one only), confusion, nervousness and irritability, loss of memory, loss of sleep, general weakness, nausea with or without vomiting, frequent micturition, loss of sexual power, poor appetite, cold extremities, palpitation, indigestion, bad dreams, cramps, tinnitus aurium, trembling, weakness in the back apart from general weakness, inability to read, inability to confine the mind to work, photophobia, emotional tendency, muscular twitching, paræsthesia, faintness, sensation of heat, flushes and chills, despondency, muscæ volitantes, hallucinations of sight, inability to confine the attention, change in disposition, difficult micturition, hysterical attacks, sense of swelling in the side, indescribable sensation, dragging in the abdomen, night-sweats, sense of fear, temporary diplopia, temporary ptosis, drawing in the neck, leucorrhœa, increased perspiration, apathy, light feeling, difficulty in swallowing, difficulty in talking, a sense of pulling in the stomach, sense of constriction, sense of swelling in the eyelids, fluttering of the stomach, sense of impending ill, stupid feeling, sense of pulling in the eyes, of pulling in the head, of pressure in the head, of tightness about the hip, of an electric shock, of the heart being squeezed, of the head separating, sensation as if knocked upwards, epistaxis, increased stuttering.

Forty complained of numbness: ten of these complained of more or less well-defined left hemi-anæsthesia, seven of right hemi-anæsthesia, ten of numbness in the lower extremities, two in the upper, two in the trunk, and four of general numbness. The anæsthesia was in no case limited to any special nerve-region, but was generally distributed—bounded, for example, by a line around the limbs, or by the median line of the body. The numbness remained in most cases fixed in character and situation, in some it varied in seat, in others was said to be intermittent.

Thirty complained of specialized loss of power, seven in the left arm and leg, four in the right arm and leg, twelve in both legs, eight in the left leg, one in the right leg, one in both arms. In three of these cases there was staggering gait, and in a number the gait was slow and stiff, but in most the character was that previously described. The loss of power was in no case limited to certain muscles or groups of muscles, but generally included whole extremities.

In none of these eighty-two cases was local atrophy of any muscle or group of muscles found, though general lack of tone of the muscular system was found in quite a number, evidenced by flaccidity. The general nutrition, including that of the muscular system, was good in sixty, fair in eighteen, poor in three, not noted in one.

The tendon reflex was in most cases within the average of health. In thirty-one it was noted as very active (unaccompanied by clonus), and in a considerable number of these the activity was accompanied by a disagreeable sensation. In no case was ankle-clonus present.

A word with regard to the tendon reflex: This phenomenon varies in health from practically wanting to quite violent, the former condition occurring only in isolated cases, the latter less infrequently. I have in mind an instance of a perfectly healthy person in whom repeated trials by neurologists have failed to produce a trace of reflex, even with the aid of re-enforcement.

The fact that these cases occur, however rarely, prevents our making a diagnosis of organic disease upon this symptom alone, a fact not always recognized. Again, a lively reflex is not infrequently mistaken in these cases for the exaggerated reflex of organic disease of the motor tract, while in reality pointing either to nothing abnormal or to a functional disturbance.

The pupils in general were alike and reacted normally to light. In four they were unlike (the left being in each case the larger), but both reacted perfectly. In one case seen recently, a pupil-irregularity was present which does not come under these heads; but, as the case is not yet settled, I am not at liberty to discuss it at present.

Disturbance of electrical reaction was found in none; this test was made in most of the cases where any complaint of loss of power was made as well as in many others.

The legs were measured in all cases where complaint was made of this part of the body, and in many others. In the fifty-seven cases noted they were alike in twenty; the right was larger in twenty-one, the left in sixteen, the measurements being taken at the calf. In those cases in which the right was larger, the difference was one-sixteenth inch in one, one-eighth inch in eight, one-fourth inch in eight, three-eighths inch in three, five-eighths inch in one. In those in which the left was larger, the difference was one-sixteenth inch in two, one-eighth inch in four, three-sixteenths inch in one, one-fourth inch in seven, three-eighths inch in one, one-half inch in one. No greater differences than these were found. It is evident that these measurements varied little, if at all, from those of health, as shown, for example, by series of measurements made by Dr. M. H. Richardson. Nor did the difference always correspond to the leg complained of, nor, in fact, were the legs complained of in all the cases where difference was noted. These measurements were in striking contrast to that of the case mentioned above as infantile paralysis, in which the difference at the calf was three inches. In regard to measurement of the calves, I have found it more accurate to measure the largest part for comparison, making, if necessary, a series of measurements, and noting the largest on each leg, than to first measure down or up from a fixed point. In measuring the thigh, however, the latter plan is of course necessary.

The comparison of measurements taken at any one time with those taken at another time is fallacious where the difference is no greater than those recorded here, inasmuch as the tape may be drawn more loosely at one time than another. This can be controlled more accurately, however, where it is a question of measuring the two legs at one time. Comparison of the measurement of two different physicians is even more fallacious.

Stiffness of the back was noted in a considerable number of the cases. In two cases old Pott's disease was present.

The ages of these eighty-two cases ranged from fifteen to seventy-five. With the exception of one case at fifteen, I have never seen these symptoms complained of under seventeen, though suits are not infrequently brought for other forms of injury in children. This is a peculiarity of the neuro-psychoses worthy of consideration.

The character of the pulse was generally normal. Its frequency was noted in fifty-nine cases, thirty-one male and twenty-eight female.

Of the male pulses, one was 68, eight were between 70 and 80, nine were between 80 and 90, three were between 90 and 100, two were between 100 and 110, two were between 110 and 120, four were between 120 and 130; the average was 90½.

Of the female pulses, one was 68, two were between 70 and 80, six were between 80 and 90, seven between 90 and 100, six between 100 and 110, two between 110 and 120, two between 120 and 130, and one was 135; the average was 95¾.

This point I have already alluded to. It is difficult to eliminate the factor of excitement under examination in these medico-legal cases, for a great degree of excitement is not necessary to cause marked acceleration of the pulse.

I have a number of times found pulses over 100 in the case of healthy professional gentlemen just about to go upon the witness-stand, none of whom showed any external sign of excitement; in one such case the pulse was 120. In corroboration of these statements, Dr. Prince and Dr. Ham inform me that their records as pension-examiners show so continuously high a pulse-rate, whatever the nature of the complaint, that they have become accustomed to rely entirely on the character without reference to the rate. Dr. Carter has given me a list of pulses from neurasthenic patients at the clinic, which ranged all the way from 80 to 120.

The objection may be made to my reports that another observer might have discovered loss of electrical reaction or other sign of organic disease, where I did not. In fact, such symptoms have been claimed in many of these very cases; in no case, however, I believe, by a neurologist. Nothing is more common than for the general practitioner to be deceived on this point, through lack of familiarity with the motor points, and the strength of current required to produce contractions, and the allowance to be made for cutaneous resistance. I have not infrequently seen the patient jump with the presumably well leg and fail to do so with the other, when the electricity was applied, either because of anæsthesia of the latter limb or through fraud; this jump I have seen mistaken for an electrical reaction. Again, I have heard the remarkable statement made that the motor points must have been stimulated, as the electrodes were applied all over the extremities.

Page has been criticised as having laid too much stress upon the strain of the back in explaining many of the symptoms referred to that region. As already stated, I have noted rigidity of the back in a considerable number of the cases, and made the diagnosis of strain, either of muscles, ligaments, or both.

In a large number, however, the back was perfectly flexible, as shown by bending forward and backward, sidewise, and twisting. That this symptom is sometimes simulated has been shown by certain patients who have declared themselves unable to make these movements, but who have exhibited perfect flexibility of the column while removing their underclothing. Where severe wrench of the back is present the injury is by no means to be regarded as trivial, this affection being sometimes extremely persistent and troublesome, although its tendency is, in general, in the direction of improvement. As Thorburn has pointed out, the rapidity of improvement in all the symptoms will depend largely upon the surroundings of the patient, as well as upon his temperament and previous condition. Inasmuch as the active exercise of will-power is bound to be an element in the improvement, it is not surprising that this improvement is frequently postponed until after the depressing surroundings and uncertainties incident to legal proceedings have been removed, together with the inducements to morbid introspection thereby afforded.

This being true, even in cases where no deception is present, it is of course more so where the patient willingly drifts into invalidism. Deliberate simulants are quite apt to appear worse and worse as the trial approaches.

My experience, as far as I have had opportunity to follow cases where no claim for damages existed, or to follow legal cases after such claim has been adjusted, does not justify the assertion that a common tendency [illegible] downward, although I have not infrequently seen cases appearing worse and worse up to the time of trial (sometimes especially so within a few days of the trial). I am convinced that the case where this downward tendency continues afterward is a rarity among the class under consideration. In fact, even in organic injuries, as fracture of the vertebræ, this gradual downward tendency is hardly the rule, inasmuch as, in most such cases, death either follows within a comparatively short period or improvement sets in up to a certain point, to be followed by standstill. As an exception to this rule may be mentioned Bernhardt's[20] case of gradually developing spinal tumor discovered by post-mortem examination. With regard to the case of general paralysis, described by the same author, the connection between the accident in 1875 (from which the patient recovered, so far as to be able to do active work satisfactorily), and a typical general paralysis, disclosing itself in 1886, is not absolutely established.

---

[20] Deutsche med. Wochenschr., 1888, No. 13, p. 245.

In conclusion, such careful clinical work as that of Page should not be undervalued on the ground of necessary bias. On the contrary, such efforts should rather tend to further the cause of justice in the long run, to plaintiffs as well as to defendants, for if we regard functional (to say nothing of fraudulent) cases as sufferers from organic disease of the spinal cord, the tendency will be, as the recovery of more and more of these cases goes on record, to produce distrust, not only of medical acumen, but of the statements of claimants in general, so great as to deprive of their just dues cases of hopeless organic disease, even when vouched for by most distinguished medical authority.

## CEREBRAL COMPLICATIONS OF EAR DISEASE.

The "Medical Age," Jan. 10, 1890, quoting from the "Deutsche Med. Zeitung," gives Dr Otto Körner, of Frankfort, as authority for the statement that all cerebral complications of ear disease are more frequent on the right side than on the left. Of thirty-one cases of cerebral abscess, eighteen occurred on the right side from disease of the ear, and twelve on the left, while in one there was abscess on both sides following ear trouble. Of sixty-one cases of thrombosis of the lateral sinus, thirty-five were on the right and twenty-six on the left side. Out of twenty-three cases of meningitis from ear disease, seventeen were on the right side and three on the left. This makes a total of one hundred and fifteen cases, of which seventy showed abnormities on the right side, forty-four on the left, and one bilateral. Körner traces the greater frequency of right-sided troubles to the fact that the groove for the lateral sinus passes further forwards and outward into the petrous and mastoid bones on the right than on the left side. Therefore the bony wall separating the sinus from the mastoid antrum is thinner on this side. Add to this the fact that in brachycephalic skulls the anterior cerebral fossa is considerably nearer the mastoid than in the dolicho-cephalic, and it will be perceived why cerebral complications more readily ensue in brachycephalic skulls.